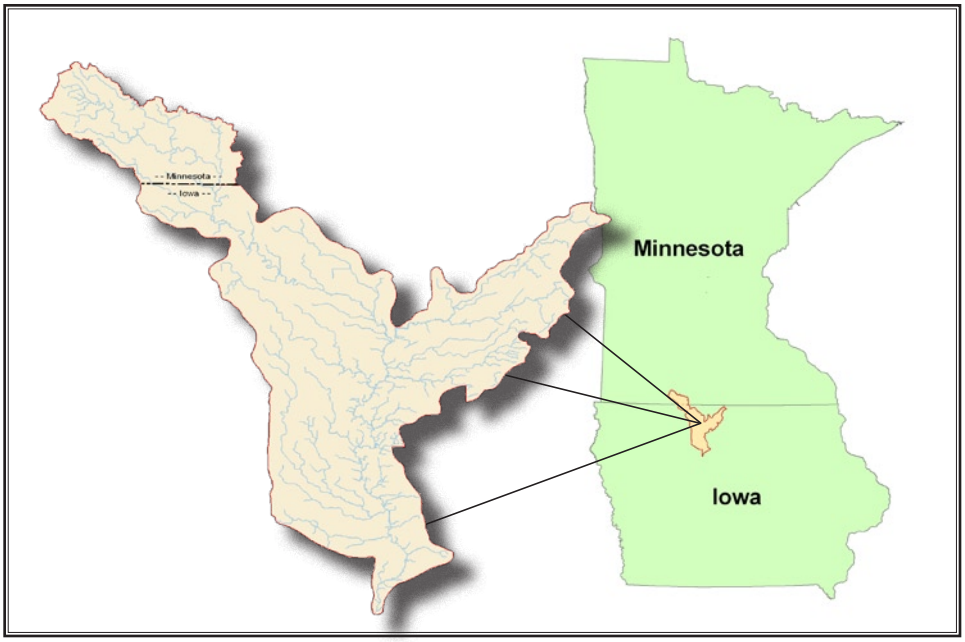
Rapid Watershed Assessment:

East Fork Des Moines River

(MN, IA) HUC: 07100003



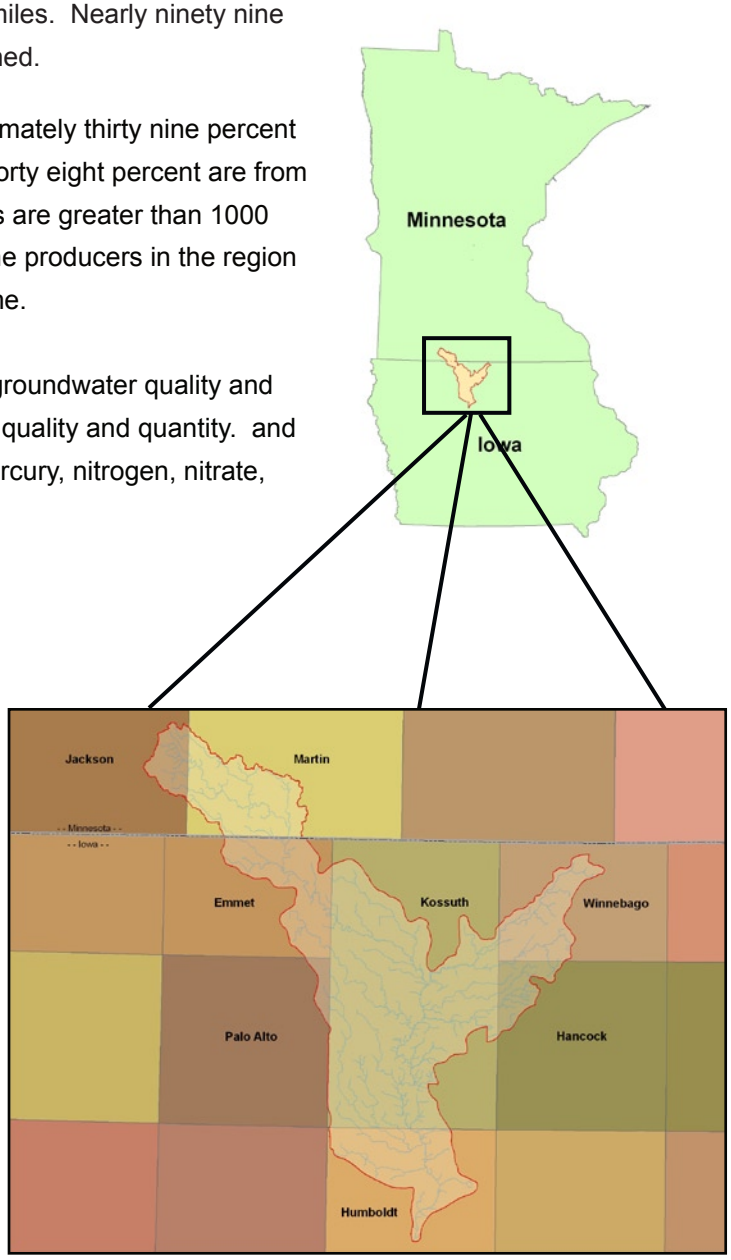
Rapid watershed assessments provide initial estimates of where conservation investments would best address the concerns of landowners, conservation districts, and other community organizations and stakeholders. These assessments help land–owners and local leaders set priorities and determine the best actions to achieve their goals.

Introduction

The East Fork Des Moines River 8-Digit Hydrologic Unit Code (HUC) subbasin is located in the Western Cornbelt Plains of Southwestern Minnesota and Northern Iowa. This largely agricultural watershed has a drainage area of 839,518 acres, or 1,308 square miles. Nearly ninety nine percent of the land in the subbasin is privately owned.

There are 1,905 Farms in the Watershed. Approximately thirty nine percent of the operations are less than 180 acres in size, forty eight percent are from 180 to 1000 acres in size, and the remaining farms are greater than 1000 acres in size. Approximately fifty four percent of the producers in the region are full-time operators not reliant on off-farm income.

The main resource concerns on the cropland are groundwater quality and quantity, nutrient management, soil erosion, water quality and quantity. and increased pollutant loadings to surface waters (mercury, nitrogen, nitrate, turbidity, ammonia, phosphorous, fecal coliform).



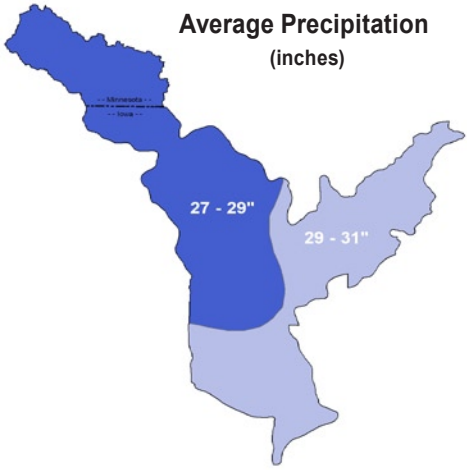
County Totals

County	*Acres in HUC*	*% HUC*
Emmet - IA	90,332.2	10.8%
Kossuth - IA	403,276.1	48.0%
Winnebago - IA	68,890.8	8.2%
Palo Alto - IA	11,385.3	1.4%
Hancock - IA	33,299.3	4.0%
Humboldt - IA	101,982.8	12.1%
Jackson - MN	28,646.6	3.4%
Martin - MN	101,732.9	12.1%
Total acres:	**839,518.0**	**100%**

Physical Description

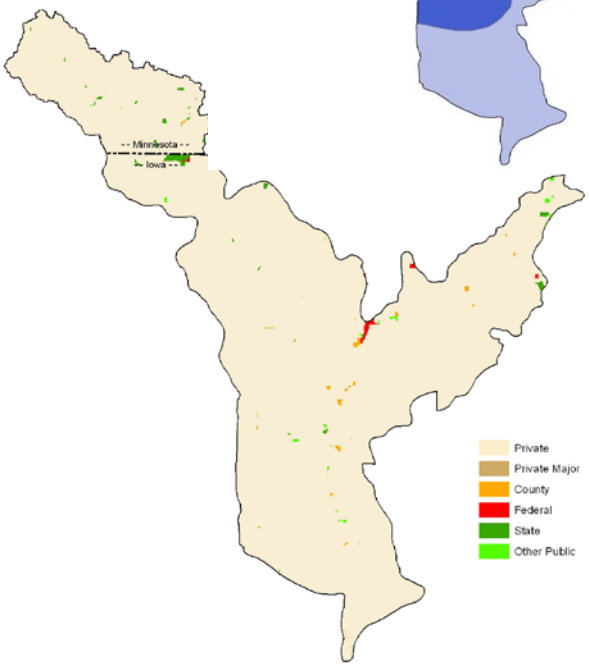
The East Fork Des Moines River originates in Tuttle Lake within Emmet County, Iowa, on the Iowa-Minnesota border. The east fork flows south-southeast about 120 miles through the cities of Armstrong, Algona, St. Joseph, Livermore, and Dakota City to its confluence with the West Fork Des Moines River, about 5 miles south of Dakota City, within Humboldt County. The two forks join at Frank Gotch State Park to become the Des Moines River, which then flows roughly southward through Fort Dodge.

Precipitation in the watershed ranges from 27 to 31 inches annually. Most lands within this watershed are not highly erodible, and are well to moderately well suited to agricultural uses. Predominate land uses are row crops (87%), Residential / Commercial (6.3%), and Grass / Pasture / Hay (3.4%).



Land-use has remained relatively stable in the watershed from 1992 through 2000. Agriculture is the primary land use within the watershed and includes row crop farming, small grains, hay production, and pastureland. Livestock feeding operations occur throughout the watershed, with hog and beef operations being the most common.

Row crop farming is relatively constant across the entire watershed, with corn and soybeans accounting for over 84 percent of the land use during the 2002 crop season..



Ownership*[1]

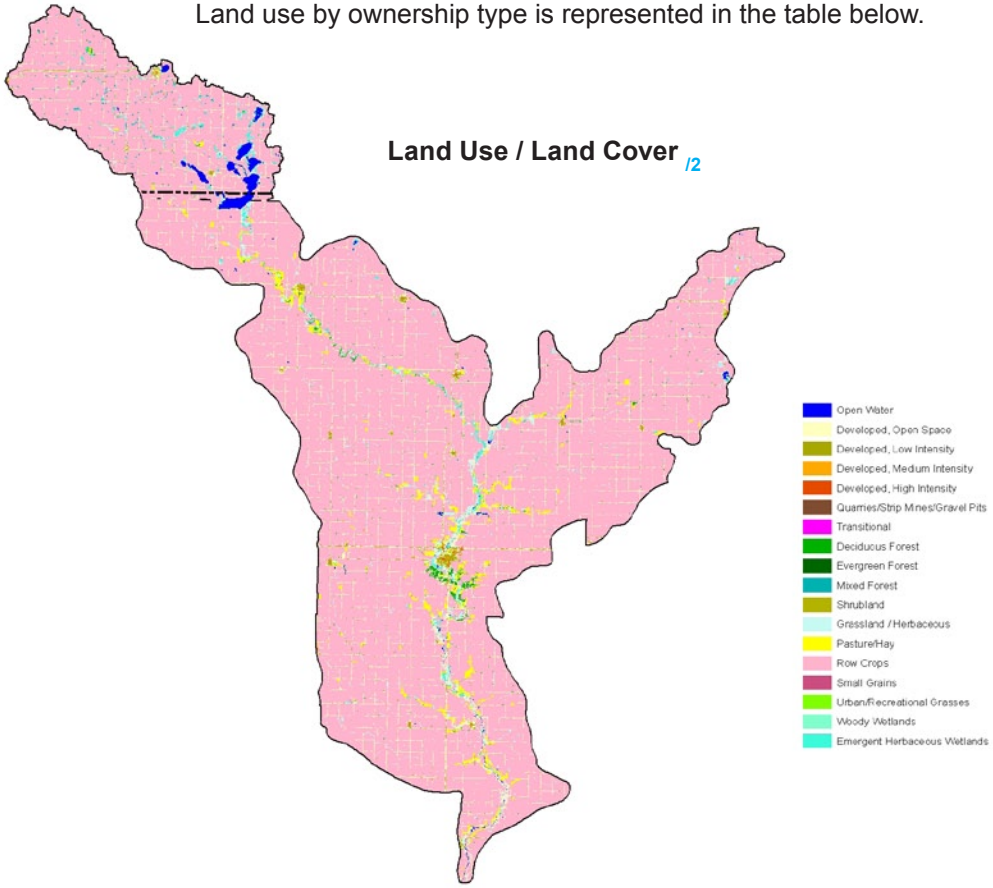
Ownership Type	Acres	% of HUC
Conservancy	0.00	0.00
County	1769.62	0.21
Federal	1393.26	0.17
State-Misc.	3458.98	0.41
Other Public	1230.53	0.15
Private Major	49.02	0.01
Private	831616.60	99.06
Tribal	0.00	0.00
Total Acres:	**839518.00**	**100**

* Ownership totals derived from 2007 MN DNR GAP and 2002 IOWA Gap data and are the best suited estimation of land stewardship available on a statewide scale at time of publication. See the bibliography section of this document for further information.

Ownership / Land Use

The East Fork Des Moines Watershed covers an area of 839,518 acres. Nearly ninety nine percent of the land in the watershed is owned by private landholders (831,616 acres). The second largest ownership type is State, with just less than 3,460 acres (0.41%), followed by County with approximately 1,770 acres (0.21%), and Federal with 1,393 Acres (0.17%). There are an additional 1,230 Acres of miscellaneous public lands, and ownership data indicates no major tribal or conservancy land holdings in the basin. Land use by ownership type is represented in the table below.

Land Use / Land Cover /2



Ownership / Land Use /3

	Public		Private**		Tribal			
Landcover/Use	**Acres**	**Percent**	**Acres**	**Percent**	**Acres**	**Percent**	**Total Acres**	**Percent**
Forest	314.24	0.0%	4,319.35	0.5%	0.00	0.0%	4633.60	0.55%
Grain Crops	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.00%
Grass, etc	1,951.24	0.2%	26,482.39	3.2%	0.00	0.0%	28433.63	3.39%
Orchards	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.00%
Row Crops	1,786.99	0.2%	731,617.39	87.2%	0.00	0.0%	733404.38	87.37%
Shrub etc	0.00	0.0%	329.14	0.0%	0.00	0.0%	329.14	0.04%
Wetlands	2,069.57	0.2%	11,461.60	1.4%	0.00	0.0%	13531.17	1.61%
Residential/Commercial	365.17	0.0%	52,327.73	6.2%	0.00	0.0%	52692.90	6.28%
Open Water*	1,357.69	0.2%	5,035.49	0.6%	0.00	0.0%	6393.18	0.76%
* ownership undetermined			** includes private-major					
Totals:	**7,844.90**	**0.93%**	**831,573**	**99.07%**	**0.00**	**0.00%**	**839418.00**	**100.00%**

Physical Description (continued)

			cu. ft/sec	
Stream Flow Data	USGS 05479000 East Fork Des Moines River at Dakota City, IA	**2006 Total Avg.**	939.3	
		May – Sept. Avg.	748	
		ACRES/MILES	**PERCENT**	
Stream Data[4] *(*Percent of Total HUC Stream Miles)*	Total Miles – Major (100K Hydro GIS Layer)	939.13	---	
	303d/TMDL Listed Streams (DEQ)	102.51	10.9%	
Riparian Land Cover/Land Use[5] *(Based on a 100-foot buffer on both sides of all streams in the 100K Hydro GIS Layer)*	Residential / Commercial	1,473	6.49	
	Fallow	0	0	
	Forest	607	2.67	
	Grain Crops	0.0	0.0	
	Grass/Pasture	4,676	20.62	
	Orchards/Vine	0	0	
	Row Crops	12,165	53.64	
	Shrub/Range	12.25	0.05	
	Water	694	3.06	
	Wetlands	3,052	13.46	
	Total Buffer Acres	**22,679**	---	
Crop and Pastureland Land Capability Class[6] *(Croplands & Pasturelands Only) (1997 NRI Estimates for Non-Federal Lands)* ***Estimates for MN Portion of HUC Only***	**1** – slight limitations	25,800	21%	
	2 – moderate limitations	80,500	65%	
	3 – severe limitations	18,500	15%	
	4 – very severe limitations	0	0%	
	5 – no erosion hazard, but other limitations	0	0%	
	6 – severe limitations; unsuitable for cultivation; limited to pasture, range, forest	0	0%	
	7 – very severe limitations; unsuitable for cultivation; limited to grazing, forest, wildlife habitat	0	0%	
	8 – miscellaneous areas; limited to recreation, wildlife habitat, water supply	0	0%	
	Total Croplands & Pasturelands (MN)	**124,800**	**---**	
	TYPE OF LAND	**ACRES**	**% of Irrigated Lands**	**% of HUC**
Irrigated Lands[7] *(1997 NRI Estimates for Non-Federal Lands Only)*	**Cultivated Cropland**	0	0%	0%
	Uncultivated Cropland	0	0%	0%
	Pastureland	0	0%	0%
	Total Irrigated Lands	0	0%	0%

Assessment of Waters

Section 303(d) of the Clean Water Act states that water bodies with impaired use(s) must be placed on a state's impaired waters list. A water body is "Impaired" or polluted when it fails to meet one or more of the Federal Clean Water Act's water quality standards. Federal Standards exist for basic pollutants such as sediment, bacteria, nutrients, and mercury. The Clean Water Act requires states to identify and restore impaired waters.

Minnesota and Iowa's impaired waters lists, updated every two years, identifies assessed waters that do not meet water quality standards. The primary tool for addressing impaired waters is a pollution reduction plan called a Total Maximum Daily Load, or TMDL. After impaired use(s) have been identified, the TMDL process identifies all sources of each pollutant. The plan then determines how much each source must reduce it's contribution in order to meet the applicable water quality standard. The Clean Water Act requires a completed TMDL for each water quality violation identified on a state's impaired waters list. Lakes or river reaches with multiple impairments require multiple TMDLs.

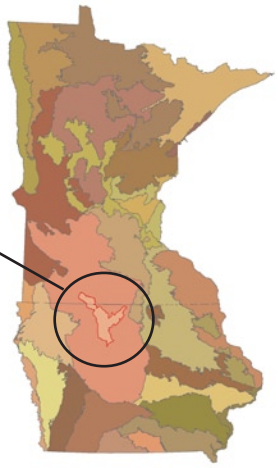
Listed Stream / Reach [8]	Impairment	Affected Use
DES MOINES RIVER, EAST BRANCH; HEADWATERS TO TUTTLE LK	Low Dissolved Oxygen Turbidity	Aquatic Life, Aquatic Recreation
DES MOINES RIVER, EAST BRANCH; Below HWY 169 Divine Access	Indicator Bacteria (Fecal Coliform)	Aquatic Life, Aquatic Recreation,
DES MOINES RIVER, EAST BRANCH; PRAIRIE CR. TO TRIBUTARY S. OF ARMSTRONG	Low Biotic Index	Aquatic Life
DES MOINES RIVER, EAST BRANCH; FROM SOLDIER CR. TO TUTTLE LAKE	Organics, Low DIssolved Oxygen	Aquatic Life, Aquatic Recreation
BUFFALO CREEK	Low Biotic Index (Habitat Alterations)	Aquatic Life
TUTTLE LAKE	Low Dissolved Oxygen, Noxious Aquatic Plants	Aquatic Life, Aquatic Recreation

Common Resource Areas

The East Fork Des Moines Watershed is located within a single common resource area, CRA 103.1. [9]

103.1 – Iowa and Minnesota Till Prairies: Primarily loamy glacial till soils with scattered lacustrine areas, potholes, outwash and flood plains. Nearly level to gently undulating with relatively short slopes. Most of the wet soils have been artificially drained to maximize crop production.

Primary land use is cropland. Corn, soybeans, sugar beets, peas and sweet corn are the major crops. Native vegetation was dominantly tall grass prairie. Resource concerns are water and wind erosion, nutrient management, and water quality.



Only the major CRA units are described above.
For further information, go to:
http://soils.usda.gov/survey/geography/cra.html

Geology / Soils [10]

The major soil associations found within the East Fork Des Moines River watershed include Canisteo, Nicollet, Clarion, Webster, Harps, Okoboji, and Kossuth. Canisteo soils are poorly drained, moderately permeable soils that occur on upland swales. Nicollet soils are somewhat poorly drained, moderately permeable soils that are formed on uplands. Clarion soils are well drained, moderately permeable soils formed on convex upland knolls, ridges, and side slopes. Webster soils are poorly drained, moderately permeable soils formed on upland swales, slightly higher on the landscape than calcareous Canisteo soils. Harps soils are poorly drained moderately permeable soils formed on rims of depressions on broad upland flats. Okoboji soils are very poorly drained, moderately slowly permeable soils formed in upland depressions, and Kossuth soils are poorly drained, moderately slowly permeable soils, formed on level to slightly concave slopes on uplands.

Groundwater Vulnerability:

The East Fork Des Moines River watershed overlies alluvial and drift aquifers, as well as good and viable bedrock aquifers. Alluvial aquifers consist of the unconsolidated sand and gravel deposits located beneath floodplains. These aquifers have generally excellent natural water quality and are capable of high yields in larger valleys, but have a high potential for both aquifer and well contamination. Within, and down gradient of, the East Fork Des Moines River watershed, are a number of agricultural drainage wells (ADWs) that drain surface runoff and tile effluent into Mississippian carbonate aquifers. The drainage water delivered to groundwater by ADWs often contains relatively high concentrations of agricultural contaminants such as nitrate nitrogen and herbicides. In addition, concerns exist about the transport of pathogen and viral constituents from land applied manure and animal feedlots into deeper groundwater, particularly in areas with large numbers of livestock.

Socioeconomic and Agricultural Data (Relevant)

Estimates for the East Fork Des Moines subbasin indicate a population of approximately 26,800 people. Median household income throughout the district is just under $36,000 yearly, roughly 78% of the national average. Employment figures for the subbasin show an unemployment rate of 4.25%, and Census data shows approximately 9% of the residents in the watershed are living below the national poverty level.

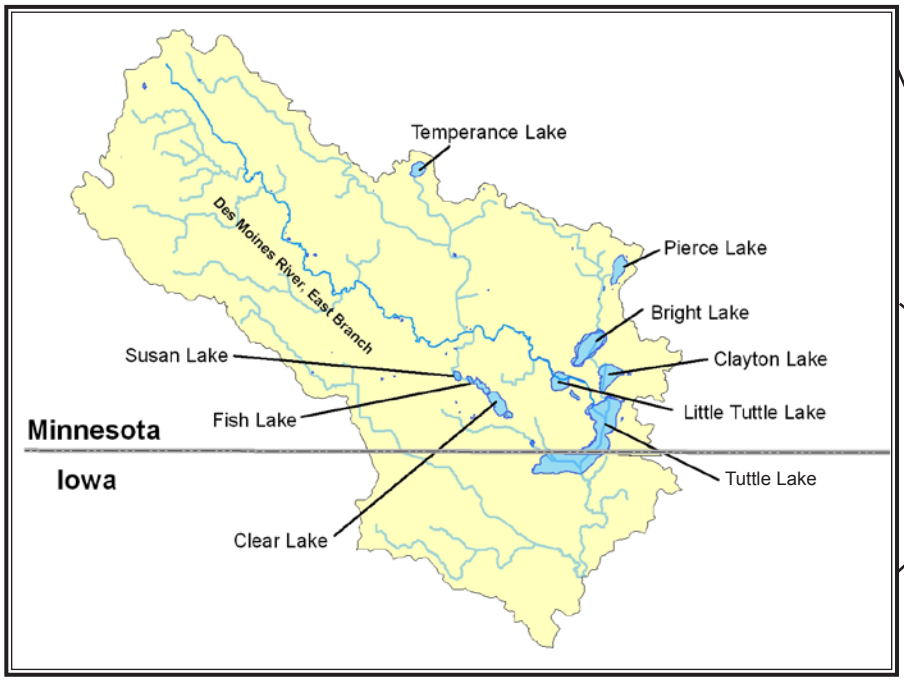
There are 1,905 Farms in the Watershed. Approximately thirty nine percent of the operations are less than 180 acres in size, forty eight percent are from 180 to 1000 acres in size, and the remaining farms are greater than 1000 acres in size.

East Fork Des Moines River (MN, IA) HUC# 07100003 /12		
Population Data	Watershed Population	26,802
	Unemployment Rate	4.25%
	Median Household Income	35,994
	% below poverty level	9.0%
	Median Value of Home	61,800
Farms	# of Farms	1,905
	# of Operators	1,378
	# of Full Time Operators	1004
	# of Part Time Operators	901
	Total Crop/Pasturelands*	**468,989**
Farm Size	1 to 49 Acres	356
	50 to 179 Acres	395
	180 to 499 Acres	537
	500 to 999 Acres	370
	1,000 Acres or more	246
Livestock & Poultry	Cattle - Beef	7,306
	Cattle - Dairy	878
	Chicken	53,962
	Swine	435,989
	Turkey	48
	Other	2,988
	Animal Count Total:	**501,171**
	Total Permitted AFOs:	**-N/A-**
Chem (Acres Applied)	Insecticides	40,893
	Herbicides	523,890
	Wormicides	3,617
	Fruiticides	0
	Total Chemicals	**568,400**
	% MN Chemical Totals	**3.98%**

* 1997 NRI Non - Irrigated Lands estimate

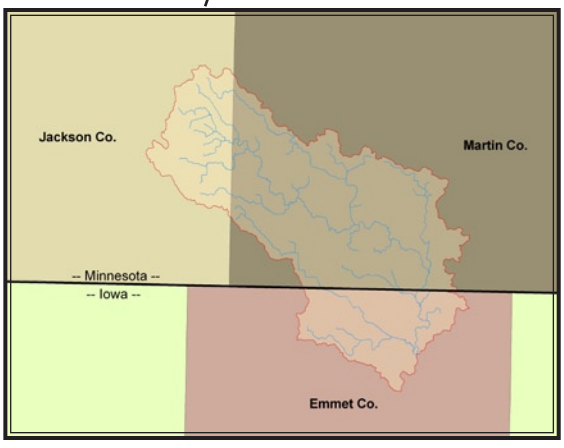
Area of Concern (A.O.C.): Sub Watershed 710003005

The 10 Digit HUC 7100003005 (Tuttle Lake) Comprises the upper portions of the East Fork Des Moines River Watershed. With a drainage area of 164,791 Acres, it comprises roughly twenty percent of the overall East Fork Des Moines subbasin. Current activities and conditions in the upstream portion of the watershed have a considerable effect on water quality throughout the lower sub-basin. The majority of TMDL listed waters in the East Fork Des Moines subbasin occur within the area of concern, including Tuttle Lake, known to many in the area as Okamanpeedan.



Area of Detail:

County	Acres in HUC	% HUC	% CTY
Emmet	35,711	21.67%	13.87%
Jackson	28,802	17.48%	6.26%
Martin	100,292	60.86%	21.49%
Total acres:	**164,791.0**	**100%**	**--**



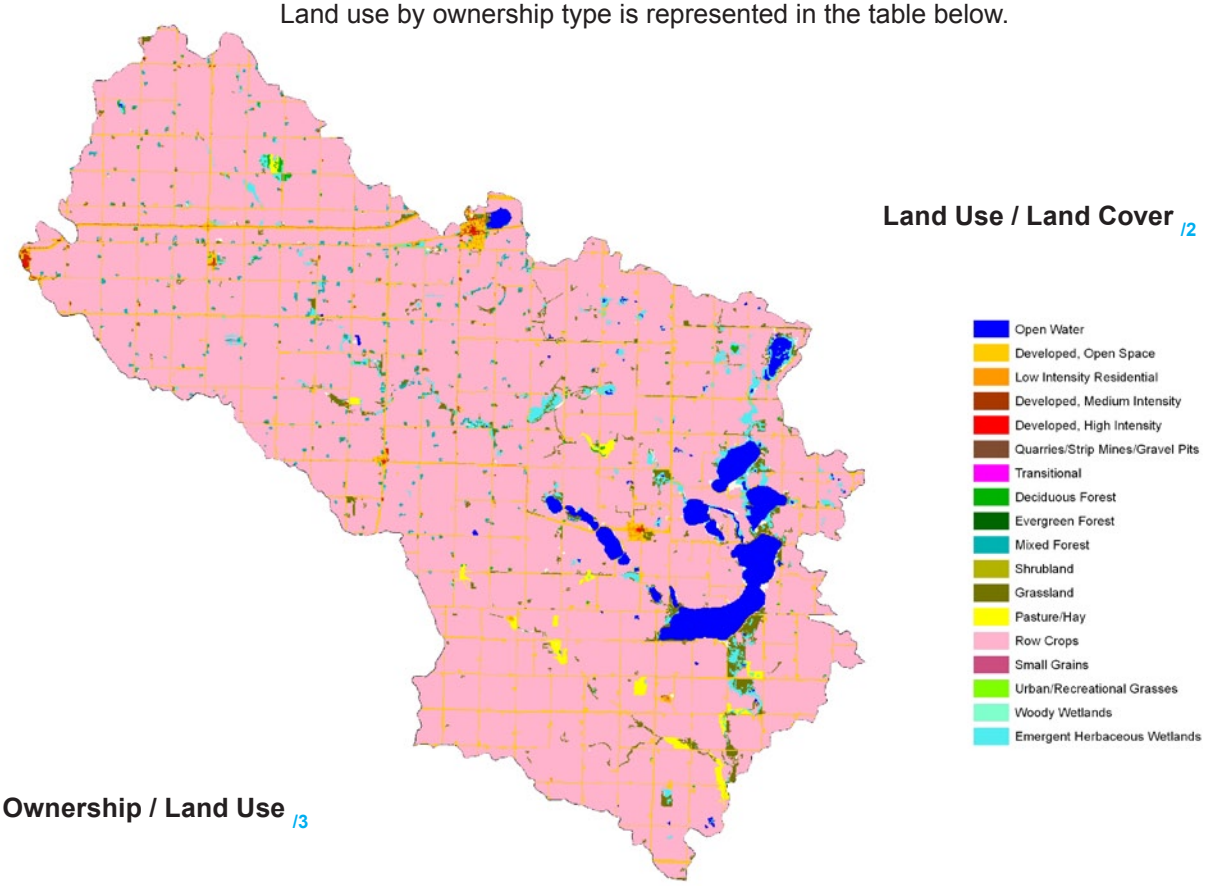
While only 15.5% of the 8-digit East Fork Des Moines Watershed lies in Minnesota, slightly more than 78% of the 10-digit HUC's drainage area occurs within Minnesota.

Area of Concern (A.O.C.): Sub Watershed 710003005

A.O.C. Ownership / Land Use

The 71000030005 10-Digit Subbasin covers an area of 164,791 acres. Nearly ninety nine percent of the land in the watershed is devoted to the production of Row Crops (140,860 acres). The second largest land use / land cover type is Residential / Commercial with just less than 9,750 acres (5.92%), followed by 5,260 acres of Open Water (3.2%), Grass / Pasture / Hay covering approximately 4,250 acres (2.58%), and wetlands that cover 3,138 acres (1.9%). Forested lands amount to 1,435 acres, or 0.87%

Land use by ownership type is represented in the table below.



Ownership / Land Use /3

	Public		Private**		Tribal			
Landcover/Use	**Acres**	**Percent**	**Acres**	**Percent**	**Acres**	**Percent**	**Total Acres**	**Percent**
Forest	48.13	0.0%	1,386.98	0.8%	0.00	0.0%	1435.11	0.87%
Grain Crops	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.00%
Grass, etc	558.56	0.3%	3,690.96	2.2%	0.00	0.0%	4249.52	2.58%
Orchards	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.00%
Row Crops	450.11	0.3%	140,409.45	85.2%	0.00	0.0%	140859.56	85.48%
Shrub etc	0.00	0.0%	99.41	0.1%	0.00	0.0%	99.41	0.06%
Wetlands	464.33	0.3%	2,674.11	1.6%	0.00	0.0%	3138.44	1.90%
Residential/Commercial	94.57	0.1%	9,654.77	5.9%	0.00	0.0%	9749.35	5.92%
Open Water*	1,039.50	0.6%	4,220.80	2.6%	0.00	0.0%	5260.31	3.19%
* ownership undetermined			** includes private-major					
Totals:	**2,655.20**	**1.61%**	**162,136**	**98.39%**	**0.00**	**0.00%**	**164791.69**	**100.00%**

Area of Concern (A.O.C.): Sub Watershed 710003005

A.O.C. Riparian Land Use / Land Cover [5]

Riparian areas were calculated by buffering all water bodies in the streams data to a distance of 100ft on all sides, and NLCD data was extracted in the resulting areas.

Riparian Land Cover / Land Use (Based on a 100ft Buffer on all sides of 100k stream data)	Land Use Type	Acres	%
	Forest	91	2.08
	Grain Crops	0	0.00
	Grass, etc	518	11.90
	Orchards	0	0.00
	Row Crops	2,726	62.65
	Shrub etc	13	0.31
	Wetlands	425	9.76
	Residential/Commercial	242	5.56
	Open Water*	337	7.74
	Total Buffer Acres:	4,351	100.00

Total Buffer area amounts to 4,351 acres, roughly three percent of the area subbasin. Row crops dominate the land use, amounting to nearly 63% of the overall buffer area, followed by Grass/Pasture/Hay at 12%, and wetlands closely behind at slightly less than ten percent. Data also indicates 242 acres (5.6%) of light to high intensity residential and commercial development in riparian areas.

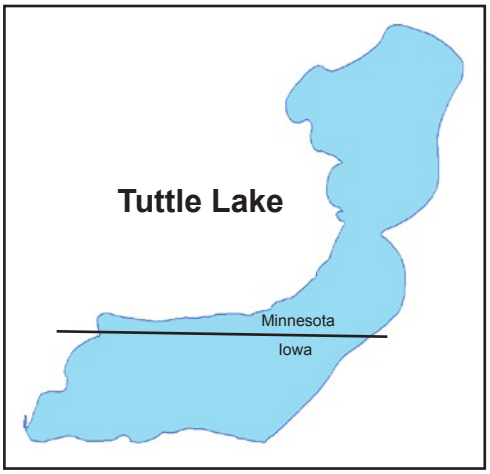
A.O.C. Impaired Waters

Both the Iowa DNR and Minnesota Pollution Control agency have assessed and listed waters in the watershed. 38 miles of the 180 stream miles in the watershed have been listed as impaired (21%). The 303d listings and impairments by waterbody are given below. Affected Uses for the listed waters include Aquatic Life and Aquatic Recreation.

Listed Stream / Reach [8]	Impairment
DES MOINES RIVER, EAST BRANCH; HEADWATERS TO TUTTLE LK	Low Dissolved Oxygen Turbidity
DES MOINES RIVER, EAST BRANCH; FROM SOLDIER CR. TO TUTTLE LAKE	Organics, Low Dissolved Oxygen
TUTTLE LAKE	Low Dissolved Oxygen, Noxious Aquatic Plants

Tuttle (Okamanpeedan) Lake Survey*

Name: TUTTLE (OKAMANPEEDAN)
Nearest Town: CEYLON
Primary County: Martin Survey Date: 06/07/2005
Inventory Number: 46-0051-00



Lake Characteristics

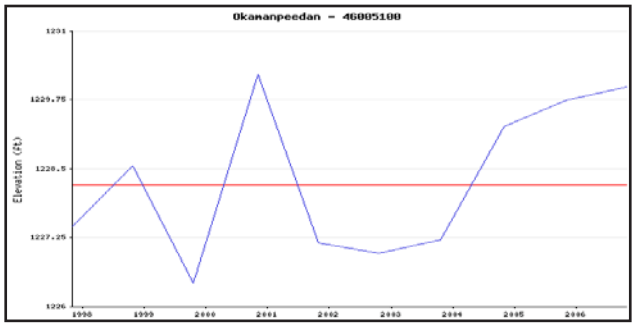
Lake Area (acres): 2,294.30
Littoral Area (acres): 2,294.30
Maximum Depth (ft): 6.50
Water Clarity (ft): 1.50 Dominant Bottom Substrate: N/A
Abundance of Aquatic Plants: abundant
Maximum Depth of Plant Growth (ft): N/A

Tuttle (Okamanpeedan) is a 2,294 acre lake of which only 1,313 acres are in Minnesota. The remaining 981 acres reside in Iowa. The lake has a maximum depth of 6.5 feet, has 12.2 miles of shoreline and is located near the town of Ceylon in Martin County. The lake is presently managed for northern pike primarily while yellow perch and white crappie are managed secondarily. Since the lake is connected to the Des Moines River and fish have a way of re-establishing themselves, the lake is only stocked with northern pike in the event of a "catastrophic" winterkill.

To promote and maintain healthy fish populations, pollution and other inputs need to be controlled. Fish habitats are directly affected by water quality. Nutrient, sediment and other waste inputs can drastically alter the biological, chemical, and physical components of a lake. It is paramount to maintain if not improve the current water quality of Okamanpeedan Lake through watershed management to preserve this fishery for future generations to enjoy.

Lake Water Level Data

Period of record: 07/29/1966 to 04/12/2007
# of readings: 319
Highest recorded: 1231.05 ft (06/21/1993)
Highest known: 1231.6 ft
Lowest recorded: 1224.34 ft (07/02/1977)
Recorded range: 6.71 ft
Average water level: 1227.9 ft
Last reading: 1229.98 ft (04/12/2007)
OHW elevation: 1228.2 ft



* Data excerpted from MN DNR's 2005 Assessment of Okamanpeedan Lake ID: 46-0051-00

To view this report and additional lake data visit the MN DNR Lakefinder at: www.dnr.state.mn.us/lakefind/index.html

Area of Concern (A.O.C.): Sub Watershed 710003005

Pollutants in the Subbasin:

Nonpoint pollution sources of consideration within the East Fork Des Moines River Watershed include:

- Land application of hog, cattle, and poultry manure and chemical applications
- Cattle contributions directly deposited in streams and water bodies
- Failing septic systems and unsewered communities
- Grazing animal populations
- Urban area runoff
- Wildlife

		A.O.C. Totals	East Fork Des Moines Totals	% East Fork Des Moines Totals
Livestock & Poultry	Cattle - Beef	1,990	7,306	27.24%
	Cattle - Dairy	359	878	40.89%
	Chicken	752	53,962	1.39%
	Swine	35,573	435,989	8.16%
	Turkey	0	48	0.00%
	Other	742	2,988	24.83%
	Animal Count Total:	**39,379**	**501,171**	**7.86%**
	Total Permitted AFOs:	**204**	**N/A**	**N/A**
Chemicals (Acres Applied)	Insecticides	9,082	40,893	22.21%
	Herbicides	95,473	523,890	18.22%
	Wormicides	1,430	3,617	39.54%
	Fruiticides	0	0	N/A
	Total Chemicals	**101,986**	**568,400**	**17.94%**

AOC Permitted Point Sources With Limits:

Facility Name	EPA NPDES ID	Receiving Stream	Facility	Population Equivalent	Design AWW Flow (MGD)	Maximum Design Flow (MGD)	Fecal Coliform Limits (CFU/100ml)
City of Ceylon, MN	MNG 580006-SD1	Tuttle Lake, Unnamed Stream/Wetland	Waste Stabilization Lagoon*	439	0.061	N/A	N/A
City of Dunnell, MN	MN 0056103-SD1	County Ditch #53 to Soldier Creek	Activated Sludge	198	0.05	N/A	Avg. 21 Max. 210
City of Sherburn, MN	MN 0024872-SD2	County Ditch #11	Activated Sludge	1,082	0.332	N/A	Avg. 20 Max. 148
City of Dakota City, IA	IA 48003	East Fork Des Moines River	Activated Sludge	1,329	0.3	0.5	Avg. 200 Max. 370

AOC Permitted Point Sources Without Limits:

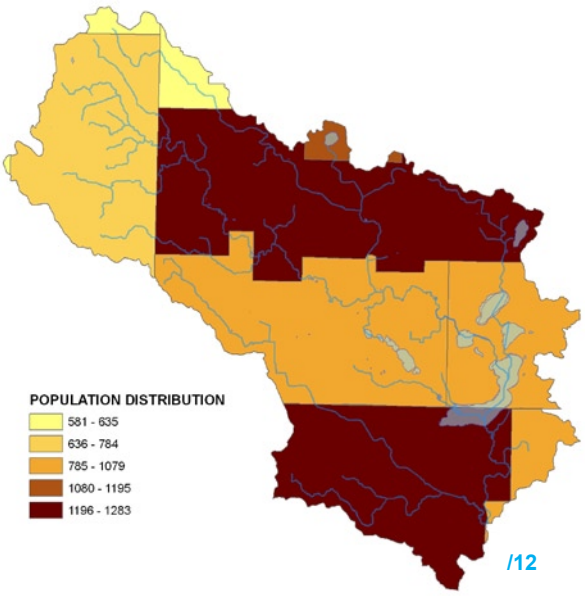
Facility Name	EPA NPDES ID	Receiving Stream	Facility	Population Equivalent	Design AWW Flow (MGD)	Maximum Design Flow (MGD)
City of Whittemore, IA	IA0033430	Lotts Creek	Waste Stabilization Lagoon*	1,102	0.160	0.306
City of Swea City, IA	IA0047813	Mud Creek	Waste Stabilization Lagoon*	970	0.063	0.095
City of Algona, IA	IA0022055	East Fork Des Moines	Trickling Filter	23,952	1.976	2.760
City of Burt, IA	IA0027405	Drainage Ditch to East Fork DSM	Waste Stabilization Lagoon*	587	0.115	0.240

Area of Concern (A.O.C.): Sub Watershed 710003005

A.O.C. Socioeconomic and Agricultural Data

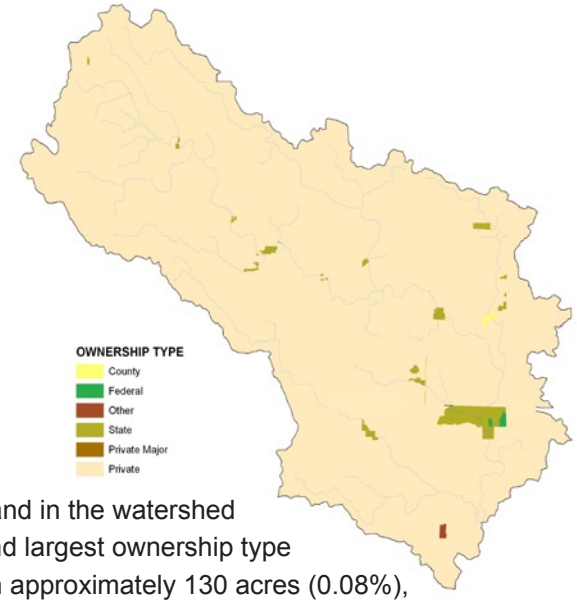
Estimates for the AOC indicate a population of approximately 6,920 people, which amounts to 26% of the population in the greater East Fork Des Moines River watershed. Median household income throughout the AOC is just under $36,200, roughly 78% of the national average. Employment figures for the subbasin show an unemployment rate of 4.4%, and Census data shows approximately 10% of the residents in the watershed are living below the national poverty level.

Population Data	Watershed Population	6,920
	Unemployment Rate	4.4%
	Median Household Income	36,172
	% below poverty level	9.94%
	Median Value of Home	61,100
Farms	# of Farms	436
	# of Operators	287
	# of Full Time Operators	190
	# of Part Time Operators	97
	Total Crop/Pasturelands	**145,108**
Farm Size	1 to 49 Acres	53
	50 to 179 Acres	104
	180 to 499 Acres	126
	500 to 999 Acres	74
	1,000 Acres or more	79



A.O.C. Land Ownership by Type

Ownership Type	Acres	% of HUC
Conservancy	0.00	0.00
County	109.53	0.07
Federal	129.22	0.08
State-Misc.	2313.31	1.40
Other Public	103.14	0.06
Private Major	0.02	0.00
Private	162135.78	98.39
Tribal	0.00	0.00
Total Acres:	**164,791.00**	**100**

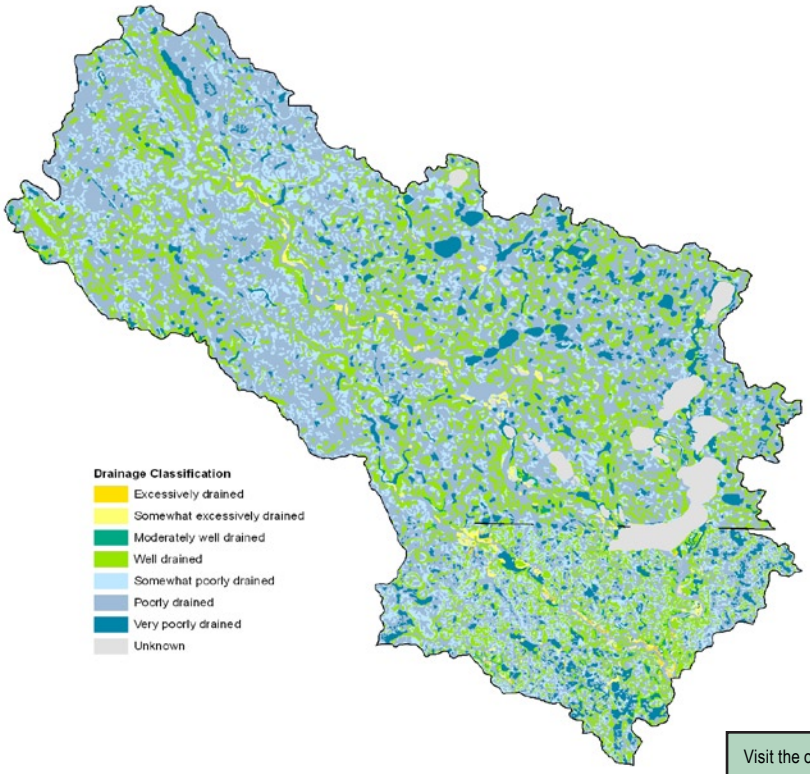


Data indicates approximately ninety eight percent of the land in the watershed is held by private landowners (162,134 acres). The second largest ownership type is State, with 2,313 acres (1.4%), followed by Federal with approximately 130 acres (0.08%), and County with 110 Acres (0.07%). There are an additional 100+ Acres of miscellaneous public lands, and ownership data shows no major tribal or conservancy land holdings in the basin.

Drainage Classification

Drainage class (natural) refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil.

Seven classes of natural soil drainage are recognized–excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained. These classes are defined in the “Soil Survey Manual.”



Visit the online Web Soil Survey at http://websoilsurvey.nrcs.usda.gov for official and current USDA soil information as viewable maps and tables. Visit the Soil Data Mart at http://soildatamart.usda.gov to download SSURGO certified soil tabular and spatial data.

Farmland Classification

Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland.

Farmland classification identifies the location and extent of the most suitable land for producing food, feed, fiber, forage, and oilseed crops.

NRCS policy and procedures on prime and unique farmlands are published in the Federal Register, Vol. 43, No 21, January 31, 1978.

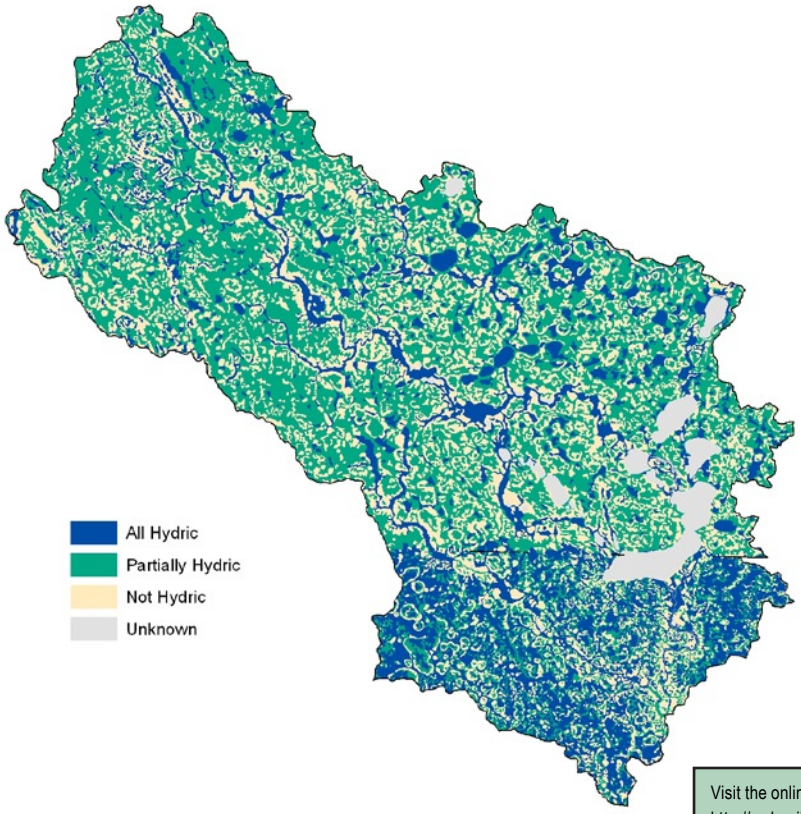
Visit the online Web Soil Survey at http://websoilsurvey.nrcs.usda.gov for official and current USDA soil information as viewable maps and tables. Visit the Soil Data Mart at http://soildatamart.usda.gov to download SSURGO certified soil tabular and spatial data.

Hydric Soils

This rating provides an indication of the proportion of the map unit that meets criteria for hydric soils. Map units that are dominantly made up of hydric soils may have small areas, or inclusions of nonhydric soils in the higher positions on the landform. Map units of dominantly non–hydric soils may therefore have inclusions of hydric soils in the lower positions on the landform.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as “soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part” (Federal Register 1994). These soils, under natural conditions, are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field.



Visit the online Web Soil Survey at http://websoilsurvey.nrcs.usda.gov for official and current USDA soil information as viewable maps and tables. Visit the Soil Data Mart at http://soildatamart.usda.gov to download SSURGO certified soil tabular and spatial data.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management.

The criteria used in grouping the soils does not include major and generally expensive land forming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forestland, or for engineering purposes.

Visit the online Web Soil Survey at http://websoilsurvey.nrcs.usda.gov for official and current USDA soil information as viewable maps and tables. Visit the Soil Data Mart at http://soildatamart.usda.gov to download SSURGO certified soil tabular and spatial data.

Resource Concerns

County Soil and Water Conservation Districts in the watershed have identified the following resource concerns as top priorities for conservation and cost sharing efforts:

- **Ground Water Quality and Quantity:** Wellhead protection / aquifer re-charge, abandoned well sealing, drainage management, long term water supply.
- **Nutrient Management:** Installation of waste control systems on high priority feedlots, identification and replacement of failing or non-compliant individual septic systems.
- **Soil Erosion:** Retention of water on the landscape, perennial covers, buffers, conservation tillage and consideration of construction impacts (esp. on shoreline and HEL).
- **Surface Water Quality & Quantity:** Stream bank and lakeshore development, impervious surfaces, flooding, impaired waters, restoring natural flows, wetland restoration.

For the Tuttle Lake AOC:

- **Soil Erosion:** Construction impacts (esp. on shoreline and HEL), Perennial cover, buffers and conservation tillage, Promoting the use of Best Management Practices
- **Drainage Management:** Restoring natural flows, Wetland Restoration, Quantity and Quality of water.
- **Water Quality: Surface Water:** Impervious surfaces, Stream bank and lakeshore development, Impaired Waters and Total Maximum Daily Loads.
  Ground Water: Wellhead protection and aquifer re-charge, Abandoned wells

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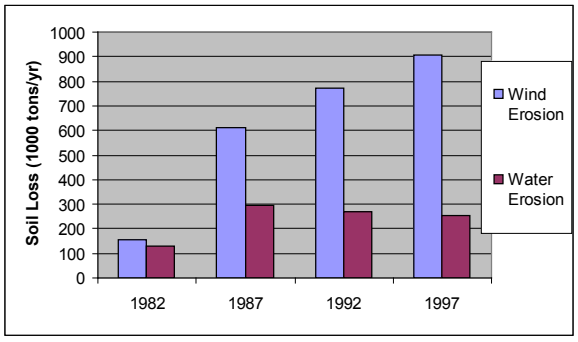
- Sheet and rill erosion by water on the cropland and pastureland increased by approximately 125,800 (97.98%) tons of soil between 1982 to 1997.

- NRI estimates indicate wind erosion rates increased by 750,700 (488.42%) tons of soil between 1982 to 1997 /13



Federally Listed Threatened And Endangered Species /14	
ENDANGERED SPECIES	**CANDIDATE SPECIES**
Fish – Topeka Shiner	**Insect –** Dakota Skipper
THREATENED SPECIES	**Species of Special Concern**
Plants – Sullivant's Milkweeed, Western Prairie White-fringed Orchid	Plants - Rattlesnake Master
Essential Habitat - -Prairie river and stream habitat for the Topeka Shiner.	

Performance Results System and Other Data /15

In the nine year reporting period Minnesota and Iowa NRCS Conservation treatment practices applied in the watershed have concentrated on the following:

- Residue Management (4,460 acres / year average)
- Nutrient Management (3,372 Acres/yr)
- Wildlife Habitat (2,323 acres/yr)
- Pest Management (1,166 acres/yr)
- Wetland enhancement, restoration, or creation (532 acres/yr).

Watershed Name:	East Fork Des Moines			HUC Number:		7100003				
PRS Performance Measures	**FY99**	**FY00**	**FY01**	**FY02**	**FY03**	**FY04**	**FY05**	**FY06**	**FY07**	**TOTAL**
Total Conservation Systems Planned (acres)	1,714	9,491	12,464	13,279	17,156	N/A	27,802	25,151	14,105	121,162
Total Conservation Systems Applied (acres)	1,392	6,381	8,565	7,208	7,216	N/A	19,781	24,652	16,148	91,343
Conservation Practices										
Total Waste Management (313) (numbers)	0	1	0	0	0	0	1	4	3	9
Riparian Forest Buffers (391) (acres)	0	10	46	54	79	68	0	0	0	257
Erosion Control Total Soil Saved (tons/ year)	46	20,832	34,778	17,372	18,348	N/A	N/A	N/A	N/A	91,376
Total Nutrient Management (590) (Acres)	0	2,592	1,473	5,481	2,322	1,146	5,923	5,347	6,062	30,346
Pest Management Systems Applied (595A) (Acres)	0	1,955	1,392	981	566	140	1,510	1,071	2,885	10,500
Prescribed Grazing 528a (acres)	0	0	0	14	0	91	0	0	0	105
Tree & Shrub Establishment (612) (acres)	31	49	107	34	41	18	14	15	3	312
Residue Management (329A-C) (acres)	137	5,069	4,251	3,773	3,457	2,525	13,994	6,549	373	40,128
Total Wildlife Habitat (644 - 645) (acres)	1,109	2,278	3,324	4,270	2,113	1,171	2,310	2,525	1,804	20,904
Total Wetlands Created, Restored, or Enhanced (acres)	0	621	256	1,072	541	486	673	825	312	4,786
Acres enrolled in Farmbill Programs										
Conservation Reserve Program	1,392	1,506	2,941	4,029	2,247	N/A	2,342	3,015	2,957	20,429
Wetlands Reserve Program	0	195	156	154	166	N/A	214	155	460	1,500
Environmental Quality Incentives Program	0	533	225	184	92	N/A	6,329	5,601	5,073	18,037
Wildlife Habitat Incentive Program	0	0	0	0	0	N/A	0	0	0	0
Farmland Protection Program	0	0	0	0	0	N/A	0	0	0	0

Enrollment in the Conservation Reserve Program **(CRP)** totals 20,429 Acres for the reporting period, or an average of 2,270 acres per year. Wetlands Reserve Program **(WRP)** enrollment totals 1,500 acres, or an average of 167 acres per year, and Environmental Quality Incentives Program **(EQIP)** enrollment amounts to 18,037 acres, or an average of 2,004 acres each year.

Watershed Projects, Plans and Monitoring /16

East Fork DSM Water Quality Improvement Plan
Iowa Department of Natural Resources

Tuttle Lake & E Fork of DSM River Watershed Project
Emmet County SWCD

Sierra Club Stream Outreach Project
Sierra Club of Iowa

Iowa Lakes Valuation Project:Tuttle Lake
Iowa DNR, Iowa State University

Tuttle Lake TMDL Plan
Iowa Department of Natural Resources

DNR Nonpoint Source Program
Iowa Department of Natural Resources

Citizen Stream Monitoring Program
Minnesota Pollution Control Agency

East Fork Des Moines River TMDL Plan
Minnesota Pollution Control Agency

East Fork Des Moines River TMDL Plan
Iowa Department of Natural Resources

Iowa Watershed Protection Program
Iowa Dept of Agriculture and Land Stewardship

IOWATER Water-Quality Monitoring Program
Iowa Department of Natural Resources

Tuttle (Okamanpeedan) Lake Survey
Minnesota Department of Natural Resources

*** Have a watershed project you'd like to see included? Submit suggestions online @ http://www.mn.nrcs.usda.gov/technical/rwa/**

Conservation Districts, Organizations & Partners

- **Emmet County SWCD**
  2109 Murray Rd. Estherville, IA 51334
  Phone (712) 362-2883 Fax (712) 362-7243

- **Hancock County SWCD**
  255 US Hwy. 69, Ste. 1 Garner, IA 50438
  Phone (641) 923-2837 Fax: (641) 923-3660

- **Humboldt County SWCD**
  1301 - 6th Ave., Ste. 2 Humboldt, IA 50548
  Phone (515) 332-3337 Fax: (515) 332-3961

- **Jackson County SWCD**
  Rt. 2 Box 9, S Highway 86 Lakefield, MN 56150
  Phone 507-662-6682

- **Kossuth County SWCD**
  605 E. State St., Ste. 2 Algona, IA 50511-2839
  Phone (515) 295-5156 Fax: (515) 295-9059

- **Martin County SWCD**
  932 N State Street #170 Fairmont, MN 56031
  Phone 507-235-6680

- **Palo Alto County SWCD**
  3302 Main Emmetsburg, IA 50536
  Phone (712) 852-3386 Fax: (712) 852-4906

- **Prairie Winds RC&D Office**
  192 State St. Garner, IA 50438-1120
  Phone: (641) 923-2837 Fax: (641) 923-3660

- **Prairie Partners RC&D Office**
  1301 6th Ave. North, Ste 2 Humboldt, IA 50548
  Phone: (515) 332-1720 Fax: (515) 332-3961

- **Winnebago County SWCD**
  163 First Ave. Box 85 Thompson, IA 50478
  Phone (641) 584-2211 Fax: (641) 584-2215

- **Iowa Department of Natural Resources**
  Wallace Bldg. 502 E 9th St. Des Moines, IA 50319
  Phone: (515) 281-5918 Web: www.iowadnr.gov

- **Minnesota Department of Natural Resources**
  500 Lafayette Road St. Paul, MN 55155-4040
  Phone (651) 296-6157 Web: www.dnr.state.mn.us

- **IA Natural Resources Conservation Service**
  210 Walnut Street, Room 693 Des Moines, IA 50309
  Phone: (515) 284-4262

- **MN Natural Resources Conservation Service**
  375 Jackson Street Suite 600 St Paul, MN 55101
  Phone (651) 602-7928

Footnotes / Bibliography

1. Ownership Layer – Source: MN Stewardship Data: Minnesota Department of Natural Resources, Section of Wildlife, BRW, Inc, 2007. This is the complete GAP Stewardship database containing land ownership information for the entire state of Minnesota. Date of source material is variable and ranges from 1976 to 2007, although a date range of 1983 to 1985 predominates. Land interest is expressed only when some organization owns or administers more than 50% of a forty except where DNR could create sub-forty accuracy polygons. IA Stewardship Data: Iowa Gap Analysis Program, Iowa GAP Stewardship Lands, 01/01/2002, merged with Native American Lands in the State of Iowa, Department of Commerce, Census Bureau, Geography Division, 08/28/2003.

2. National Land Cover Dataset (NLCD) - Originator: U.S. Geological Survey (USGS); Publication date: 19990631; Title: Minnesota Land Cover Data Set, Edition: 1; Geospatial data presentation form: Raster digital data; Publisher: U.S. Geological Survey, Sioux Falls, SD, USA.

3. Ownership layer classes grouped to calculate Public ownership vs. Private and Tribal ownership by Minnesota NRCS Rapid Watershed Assessment Staff.Land cover / Land use data was then extracted from the National Landcover Dataset Classification System and related to ownership class polygons.

4. USGS 1:100,000 Hydrography Layer .This data set represents all features coded as 'rivers' on the USGS 1:100,000-scale DLG Hydrography data set. This current version was converted to ARC/INFO by the Land Management Information Center and edge-matched across map sheet boundaries. The Hydro 100k layer was compared to MPCA's 303(d) data to derive percentage of listed waters.

5. Land Cover / Land Use / Hydro 100k Buffer. Using the 100k Hydrology dataset, All streams within HUC were spatially buffered to a distance of 100 ft. National Landcover Dataset attributes were extracted for the spatial buffer to demonstrate the vegetation and landuse in vulnerable areas adjacent to waterways.

6. Land Capability Class. ESTIMATES FROM THE 1997 NRI DATABASE (REVISED DECEMBER 2000) REPLACE ALL PREVIOUS REPORTS AND ESTIMATES. Comparisons made using data published for the 1982, 1987, or 1992 NRI may produce erroneous results. This is because of changes in statistical estimation protocols and because all data collected prior to 1997 were simultaneously reviewed (edited) as 1997 NRI data were collected. All definitions are available in the glossary. In addition, this December 2000 revision of the 1997 NRI data updates information released in December 1999 and corrects a computer error discovered in March 2000. For more information: http://www.nrcs.usda.gov/technical/NRI/

7. 1997 NRI Irrigated Land Estimates. Irrigated land: Land that shows evidence of being irrigated during the year of the inventory or during two or more years out of the last four years. Water is supplied to crops by ditches, pipes, or other conduits. Water spreading is not considered irrigation; it is recorded as a conservation practice. [NRI-97] For more information: http://www.nrcs.usda.gov/technical/NRI/

8. 303(d) Stream data. 303d listed streams were derived from the 2006 Section 303(d) of the U.S. Environment Protection Agency website: http://oaspub.epa.gov/tmdl/, Minnesota's Final Impaired Waters (per Section 303(d) Clean Water Act), 2006 http://www.pca.state.mn.us/water/tmdl/index.html#maps, and Iowa's Draft Impaired Waters 2006.

Footnotes / Bibliography (continued)

9. National Coordinated Common Resource Area (CRA) Geographic Database. A Common Resource Area (CRA) map delineation is defined as a geographical area where resource concerns, problems, or treatment needs are similar. It is considered a subdivision of an existing Major Land Resource Area (MLRA) map delineation or polygon. Landscape conditions, soil, climate, human considerations, and other natural resource information are used to determine the geographic boundaries of a Common Resource Area

10. Soil Survey Geographic Database (SSURGO) Tabular and spatial data obtained from NRCS Soil Data Mart at http://soildatamart.nrcs.gov. Publication dates vary by county. Component and layer tables were linked to the spatial data via SDV 5.1 and ARCGIS 9.1 to derive the soil classifications presented in these examples. Geological description: Jones, R.G. 1982. Soil Survey of Kossuth County, Iowa. United States Department of Agriculture (USDA). Groundwater vulnerability: Iowa Department of Natural Resources, Watershed Imrpvement Section, 2008.

11. Lands removed from production through farm bill programs. County enrollment derived from the following: CRP Acres: www.fsa.usda.gov/crpstorpt/07Approved/r1sumyr/ (7/30/04). CREP Acres: http://www.bwsr.state.mn.us/easements/crep/easementsummary.html (7/31/03). WRP Acres: NRCS (8/16/04). Data were obtained by county and adjusted by percent of HUC in the county.

12. Socioeconomic and Agricultural Census Data were taken from the U.S. Population Census, 2000 and 2002 Agricultural Census and adjusted by percent of HUC in the county or by percent of block group in the HUC, depending on the level of data available. Data were taken from MPCA and IA DNR AFO/CAFO counts provided by county for 2005.

13. 1997 NRI Estimates for sheet and rill erosion (WEQ & USLE). The NRI estimates sheet and rill erosion together using the Universal Soil Loss Equation (USLE). The Revised Universal Soil Loss Equation (RUSLE) was not used in the 1997 NRI. RUSLE was not available for previous inventories, therefore the use of USLE was continued to preserve the trending capacity of the NRI database. Wind erosion is estimated using the Wind Erosion Equation (WEQ). For further information visit http://www.mn.nrcs.usda.gov/technical/nri/findings/erosion.htm

14. Federally listed endangered and threatened species counts obtained from NRCS Field Office Technical Guide, Section II, Threatened and Endangered List. http://www.nrcs.usda.gov/Technical/efotg/. Essential fish habitat as established by Magnuson-Stevens Fishery Conservation and Management Act, Public Law 94-265, as amended through October 11, 1996 http://www.nmfs.noaa.gov/sfa/magact/

15. Performance Results System (PRS) data was extracted from the PRS homepage by year, conservation systems and practices and Hydrologic Unit Code (HUC) level. HUC level reporting was not available where N/A is listed. For more information on these and other performance reports visit http://ias.sc.egov.usda.gov/prshome/.

16. Watershed Projects, Plans, Monitoring. Natural Resources Conservation Service, Watershed Projects Planned and Authorized, http://www.nrcs.usda.gov/programs/watershed/Purpose. Information on individiual projects can be obtained by contacting the listed party.